A case of iliac artery injury treated by covered stent during carotid artery stenting

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Summary

A case of iliac artery injury during carotid artery stenting (CAS) treated by covered stent. A 74 year-old man underwent CAS for the asymptomatic right carotid artery stenosis. Under local anesthesia, right common femoral artery was punctured and 8 Fr long sheath introducer was placed. However, the sheath kinked because the iliac artery was tortuous. We introduced the stylet to the sheath again and tried to extend the kinking. It was failed and the arterial dissection was identified at the lateral iliac artery. The kink was extended with triple coaxial system, i.e. guidewire, coaxial catheter, and guiding catheter. And CAS was performed with distal filter protection. Before removal of the sheath, right iliac artery was examined and extraversation of the contrast medium was observed. The balloon catheter was placed to the lesion and dilated for the hemostasis. However, it was failed, and then the covered stent was placed subsequently. Although blood test revealed anemia and CT showed retroperitoneal hematoma after the treatment, further complication did not occur. Treatment with covered stent for the vessel injury was effective.

Key words; carotid artery stenting, complication, iliac artery injury, covered stent

Full title: A case of iliac artery injury treated by covered stent during carotid artery stenting

Running title: iliac artery injury treated by covered stent

Introduction

Carotid artery stenting (CAS) is widely spread because of its less invasiveness. Cerebral infarction, hyperperfusion syndrome, hypotension or bradycardia are listed as the complication of CAS [7]. The puncture site complication is one of the most common complication of the CAS and it may result in severe condition. Here, we report a case of iliac artery injury treated by covered stent during CAS.

Case presentation

76 year-old man who had history of left CAS had been followed for his right internal carotid artery (ICA) stenosis. Since the right ICA stenosis was progressive year-by-year and CAS was planned. Aspirin 100 mg/day, clopidgrel 75 mg/day, cilostazole 100 mg/day were started 5 days beforehand. The right common femoral artery was punctured under local anesthesia and 8 Fr Goodtec sheath introducer (Goodman, Nagoya, Japan) was place with Seldinger method. However, after removal of the guidewire and stylet, the sheath introducer was kinked due to the elongation of the iliac artery. We introduced the stylet again and tried to extend the kinking. But, it was failed and the arterial dissection was identified at the lateral iliac artery (Fig. 1A). His blood pressure 113/60 mmHg and pulse rate was 63 beats per minutes, those were not changed comparing with before the treatment. Thus, he did not complain any inguinal pain. We continued the treatment since extraversation of the contrast medium was not observed.

The kinking was extended with triple coaxial system, i.e. guidewire, coaxial catheter, and guiding catheter. And guiding catheter was introduced to the right common carotid artery. A 3000 unit of heparin was administered with monitoring of activated coagulation time. The right carotid angiogram showed high-grade stenosis at the origin of the right ICA (Fig. 1B). Wallstent 8 X 30 mm (Boston Scientific, Natick, MA) was placed with distal filter protection and the stenosis was satisfactory dilated (Fig. 1C). After the post-dilation, his blood pressure dropped to 79/45 mmHg and pulse rate decreased to 55 beats per minutes. We considered it as a result of carotid sinus reflux and treated with 1 mg of etilefrine hydrochloride and fluid transfusion. And the blood pressure returned to 119/60 mmHg. Before removal of the sheath introducer, right iliac artery was examined again and extraversation of the contrast medium was revealed (Fig. 1D). Fox cross balloon catheter 10 X 40 mm（Abbott vascular, Tokyo, Japan） was placed to the lesion and dilated for the hemostasis (Fig. 1E). Despite totally 30 minutes balloon tamponade, the extraversion remained (Fig. 1F). We decide to treat with covered stent. Sheath introducer was exchange to the 12 Fr short sheath and Excluder iliac extender 16 mm X 12 mm wideth, 70 mm length（Japan GORE, Tokyo, Japan） (Fig. 1G) was placed to the lesion from just distal portion of the bifurcation of the right internal iliac artery. Covering with the lesion, extraversation disappeared (Fig. 1H). Since patient was clear and could keep the position, we performed those procedures under local anesthesia. Postoperatively, the hemoglobin level dropped to 8.7 mg/dl from 12.2 mg/dl and CT showed retroperitoneal hematoma (Fig. 2). Fortunately, the patient complained nothing particular and was hemodynamically stable with fluid

transfusion. Examination of the sheath introducer demonstrated penetration at the kinked site (Fig. 3AB). The apex of the stylet was seen through the penetrated hole (Fig. 3C). He did not suffer from further complication and was discharged seven days postoperatively. Triple antiplatelet therapy continued until 6 months and clopidgrel was withdrawn after that. Follow-up angiography two years later revealed widely patent iliac artery (Fig. 4).

Discussion

Usually, CAS is performed via the femoral artery. As a puncture site complication, tissue injury due to the guidewire migration, retroperitoneal hematoma or inguinal hematoma due to the incomplete hemostasis are well known. Since antiplatelet therapy as well as heparinization are employed perioperatively, puncture site complication may result in severe condition. In case of CAS, it is considered that iliac artery or femoral artery are also affected with atherosclerosis. In this case, iliac artery was so elongated that the sheath introducer was kinked. We tried to extend the sheath introducer with stylet, however, it was failed and resulted in iliac artery perforation. Guidewire should be introduced firstly, and then the stylet should be introduced along the guidewire. Alternatively, Super-arrow sheath introducer (Arrow International Inc., Reading, PA) may be useful to prevent sheath introducer kinking in the elongated vessel. At the beginning, extraversation of the contrast medium was not observed and the vital signs were stable, therefore, we continued carotid artery treatment. If the patient is

complicated with hemorrhagic shock, the treatment for the iliac artery should have priority. Thus, general anesthesia or sedation may be inducted if he becomes confusion or restless.

The risk of iliac artery injury during lumber disk surgery has been reported and the incidence of serious vascular injuries, such as ateriovenous fistulas, lacerations and pseudoaneurysm, during disc surgery is 1-5 per 10000 [6, 9]. Chatziioannou et al. reported seven cases of iliac artery rupture. Five of the lesions were iatrogenic in origin (4 were external iliac artery ruptures that followed balloon dilatation and 1 common iliac artery rupture was secondary to cardiac catheterization) and 2 were ruptured mycotic aneurysms of the common and internal iliac arteries [3]. Irradiation for pelvic malignacies can be a cause of the iliac artery pseudoanurysm [4].

Since iliac artery injury may be fatal, the recovery treatment is extremely important. The standard management for rupture of the major vessel is open surgery to achieve hemostasis, but even when performed in an operating room it is hazardous because repair is hampered by heavy bleeding, emergency working conditions, and poor artery quality [3]. Endovascular treatment has been become popular as a therapeutic alternative to open surgery. Balloon tamponade should be tried firstly for hemostasis. However, the effect may be temporary, and rebleeding may occur [6, 8]. Nowadays, the endovascular device is progressing dramatically [10]. For the vascular injury or the aneurysmal lesion, several types of covered stent are developed and the usefulness has been confirmed [1, 2, 9]. Since balloon tamponade was failed in this case, covered stent was implanted.

Iliac extender is a part of covered stent for aortic aneurysm and additionally used to covering iliac lesion [5]. It is consist of self-expandable nitinol stent and PTFE graft and can be inserted via the 12 Fr sheath introducer. In this case, complete hemostasis was achieved after device implantation. Since postoperative CT demonstrated retroperitoneal hematoma and the value of hemoglobin dropped significantly, it was retrospectively considered that covered stent was absolutely needed in the emergency setting. Fortunately, he was discharged without further complication.

After implantation of the covered stent, long-term follow-up is needed because of restenosis. Antiplatelet oral therapy was required [3]. After 2 years of prescription of dual antiplatelet therapy, patency of the covered stent was excellent in this case.

Conclusions

A case of iliac artery injury treated by covered stent during carotid artery stenting was reported. Treatment with covered stent for the vessel injury was effective.

Disclosure

None.

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Figure legends

Fig. 1 Carotid artery stenting and iliac artery injury

A: After placement of sheath introducer, dissection at the elongated iliac artery was revealed (arrow).

B: High-grade stenosis was seen at the origin of the right internal carotid artery (arrow).

C: After placement of stent, the stenosis was satisfactory dilated.

D: Iliac angiography shows extraversion of the contrast medium at the injured portion (arrow).

E: Temporary balloon occlusion was attempted.

F: After temporary balloon occlusion, extraversion of the contrast medium still continued (arrow).

G: Covered stent

H: After placement of iliac artery stent, extraversion of the contrast medium disappeared.

Fig. 2 Postoperative examination

Abdominal CT shows stent at the iliac artery (white arrow) and retroperitoneal hematoma (black arrow).

Fig. 3 Sheath introducer

A: A part of sheath introducer was penetrated (arrow).

B: Hyper-magnification of the penetrated hole (arrow).

C: The apex of the stylet was seen through the penetrated hole (arrow).

Fig. 4 Follow-up angiography

The patency of the covered stent was excellent two years later.

Fig. 1

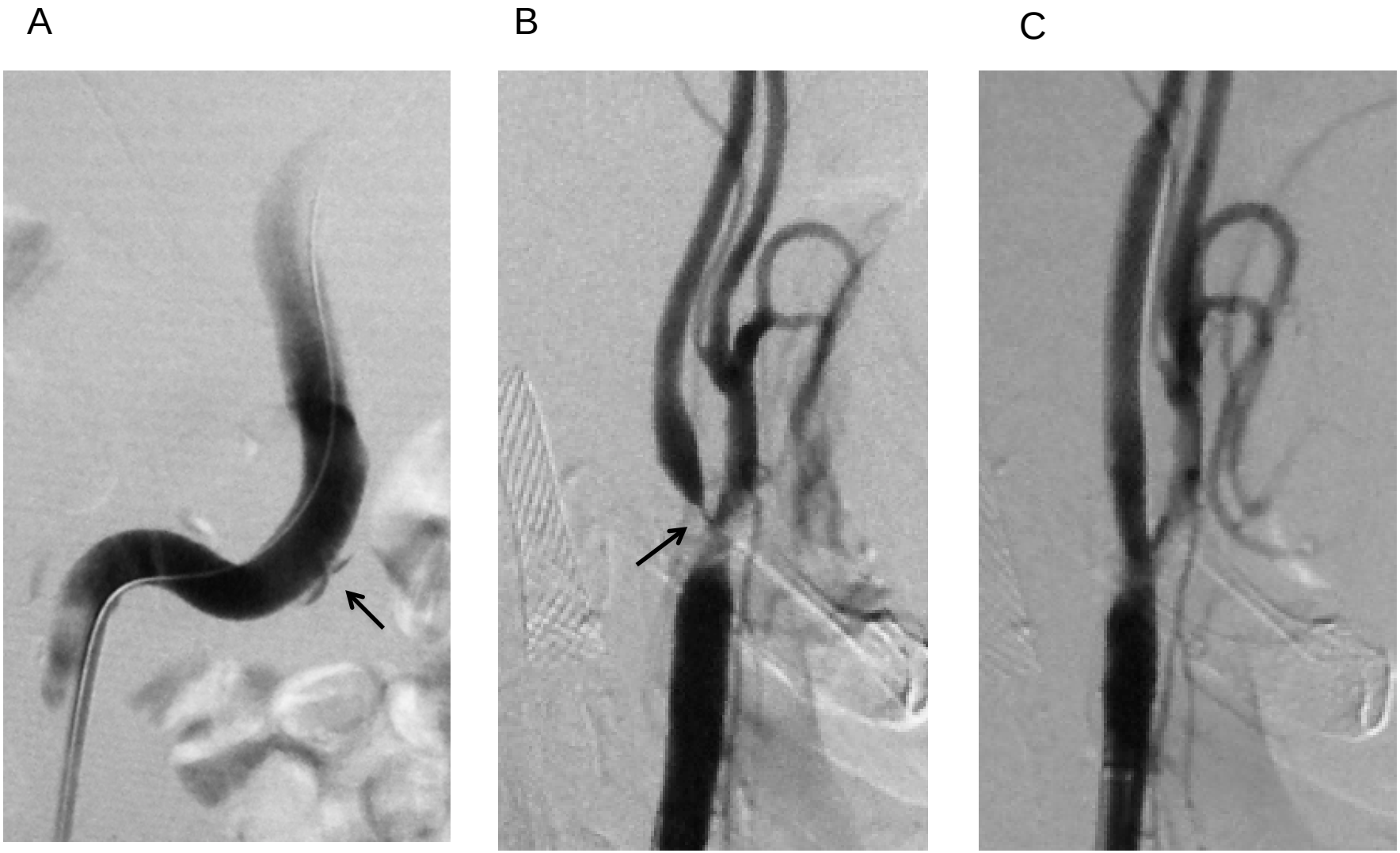
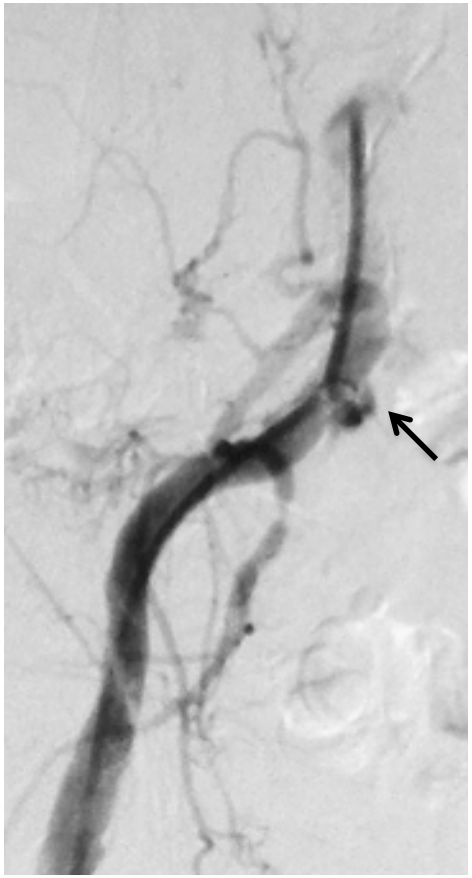


Fig. 1

D



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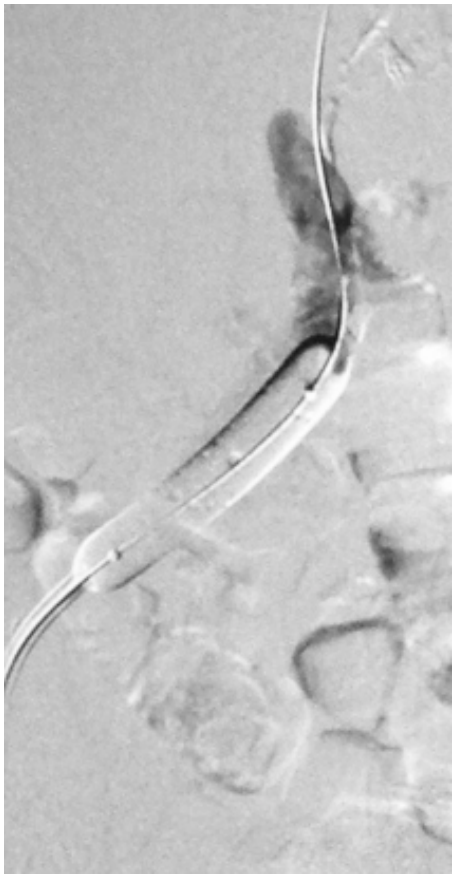

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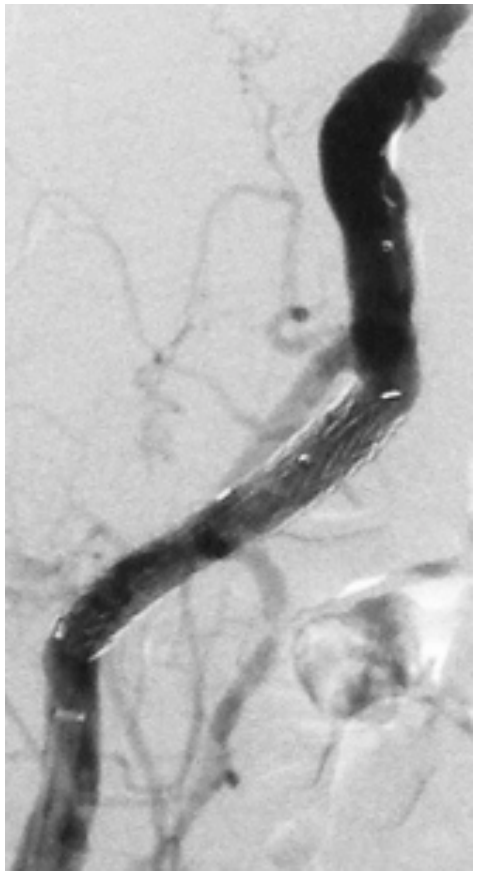

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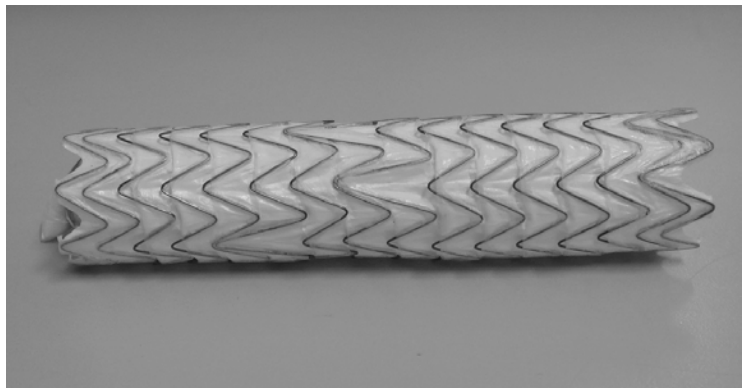
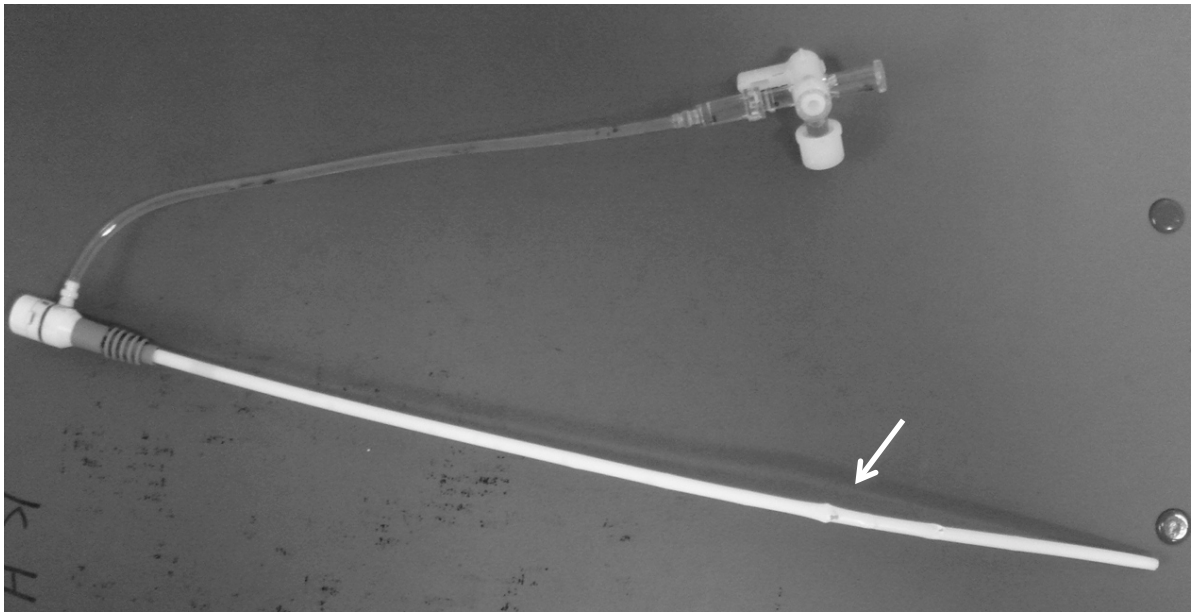


Fig. 2

Fig. 3

A



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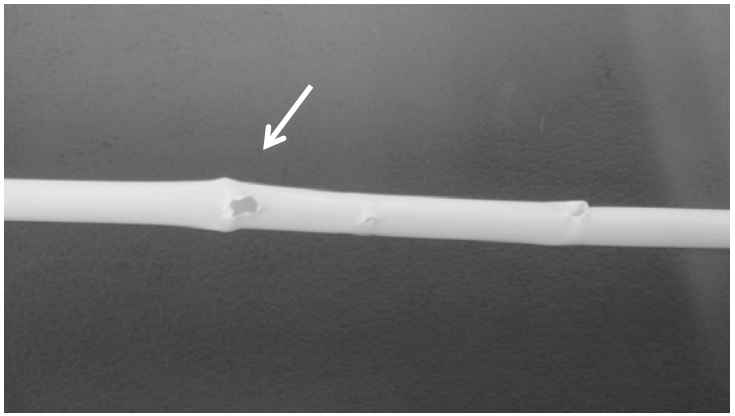

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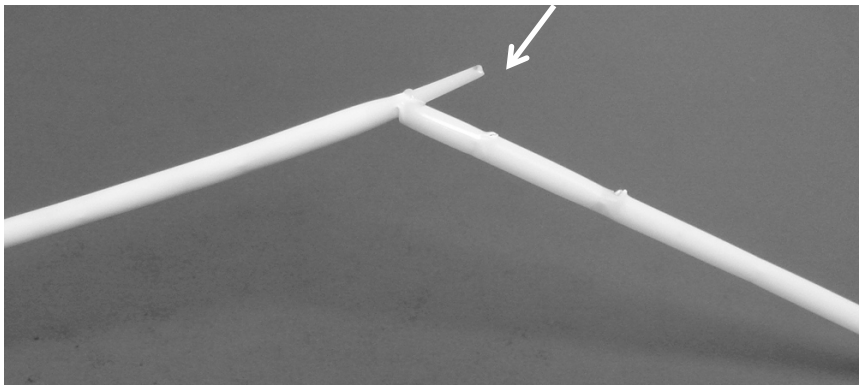

Fig. 4